

Application No. 10/029,701
Amendment filed July 7, 2004
Reply to Office Action dated April 7, 2004

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REMARKS

Claims 1, 3-8, and 15-16 are pending, with claim 1 being in independent form. By the present amendment, claims 1, 4, 15, and 16 have been amended and claims 2 and 9-14 have been canceled without prejudice or disclaimer.

In the Office Action, claims 1-2, 4-6, 9, 12, and 15 are rejected for anticipation by U.S. Patent No. 6,537,638 to Do et al. ("Do"). Claims 1, 3, 5-6 and 8 are rejected for anticipation by U.S. Patent No. 5,738,927 to Nakamura et al. ("Nakamura").

Claims 1-3, 5-6, 8, 11-12, and 14 are rejected for anticipation by U.S. Patent No. 5,750,270 to Tang et al. ("Tang"). Also, claims 7 and 13 are rejected for obviousness over Do or Tang in view of U.S. Patent No. 6,420,058 to Haratani et al. ("Haratani"). Finally, claim 7 is rejected for obviousness over Nakamura in view of Haratani. The Applicant believes the pending claims are allowable over the cited documents for the following reasons.

Anticipation requires that every feature of the claimed invention be shown in a single prior document. *In re Paulsen*, 30 F.3d 1475 (Fed. Cir. 1994); *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999). The pending claims positively recite features that are not disclosed in the cited document.

For example, claim 1 has been amended to incorporate the features of canceled claim 2. Accordingly, claim 1 now recites, among other things, "a perpendicular magnetic enhancement layer having a face centered cubic structure and a thickness of 15 nm or greater is deposited between a substrate and a perpendicular magnetic recording layer, and a perpendicular orientation promoting underlayer is disposed between the substrate and the perpendicular magnetic enhancement layer for promoting the perpendicular orientation of the perpendicular magnetic recording layer". None of the cited documents disclose or suggest these features.

The Office asserts that Do "disclose a magnetic recording medium having a first underlayer, a second underlayer formed from an fcc material (Ti), a perpendicular magnetic recording layer, and a protective overcoat (see Fig. 1)". Persons skilled in the art would understand that titanium (Ti) is not a face-centered cubic (FCC) material, as the Office asserts, but is instead a hexagonal close packing (HCP) material. Indeed, Nakamura, which is relied on separately to reject claim 1 in the Action, states that "[t]he underlayer is: (1) made of at least one material having a

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hexagonal close-packed structure and selected from a group consisting of elements Co, Hf, Mg, Os, Re, Ru, Ti, . . .". Col. 8, II. 39-41. Do does not disclose any material other than Ti for this layer. Accordingly, claim 1 is believed not to be anticipated by Do for at least this reason.

The Office also asserts that Nakamura "disclose a magnetic recording medium having a substrate, an fcc underlayer and a perpendicular recording layer thereon", as recited in claim. But the Office appears to admit that Nakamura does not disclose "a perpendicular orientation promoting underlayer disposed between the substrate and the perpendicular magnetic enhancement layer", as recited in now-canceled claim 2. Notwithstanding the Office's brief citation of claim 2 in the body of paragraph 7 of the Action, claim 2 is not listed in the heading for the rejection, nor is any portion of Nakamura cited as describing this feature. The Applicants agree that the feature, now incorporated into claim 1, is not disclosed in Nakamura.

Nakamura describe two embodiments of a perpendicular magnetic recording (PMR) media. The first embodiment, shown in FIGS. 1 and 4, includes a substrate 11, 41, a PMR layer 12, 42, and a protective layer 13, 43. The second embodiment, shown in FIGS. 2 and 5, includes a substrate 21, 51, an underlayer 22, 52, a PMR layer 23, 53, and a protective layer 24, 54. As such, Nakamura disclose at most one layer disposed between the substrate and the PMR layers. Consequently, Nakamura cannot be said to describe both the perpendicular orientation promoting underlayer and the perpendicular magnetic enhancement layer disposed between the substrate and PMR layer, as recited in claim 1. Accordingly, claim 1 is believed not to be anticipated by Nakamura either.

The Office next asserts that Tang "disclose a magnetic recording medium having a substrate, an fcc underlayer formed from Pt or Pd and a perpendicular recording layer thereon. The FCC underlayer has a thickness of 28-56 nm (col. 11, Table 1)". A closer inspection of the cited Table 1 actually reveals that Tang disclose thicknesses of 140 Å - 560 Å (or 14 nm to 56 nm) for their nucleating layer 32.

Indeed, Tang describe "a nucleating layer of a nonmagnetic metal selected from the group consisting of palladium or platinum having a thickness of greater than 50 Å" at col. 4, I. 66 to col. 5, I. 2, and col. 5, II. 15-18 and 47-50; "[t]he nucleating layer 32 is typically deposited to a depth of between about 30 and about 1000 Å, or between about 100 and about 500 Å" at col. 9, II. 39-41; and "[t]he thickness of the

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nucleating layer 32 is generally thicker than 100 Å" at col. 10, l. 58. Accordingly, Tang disclose that the nucleating layer 32 should be greater than about 3 nm.

According to the MPEP, when a prior document discloses a range which touches, overlaps or is within the claimed range, the claimed subject matter must be disclosed in the prior document with "sufficient specificity to constitute an anticipation under the statute". If the claims are directed to a narrow range, the prior document teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. See "Anticipation of Ranges", MPEP § 2131.03.

As in the example provided in the MPEP, claim 1 can be said to be define a narrower range, i.e., "a thickness of 15 nm or greater", than the broader range disclosed in Tang, i.e., "a depth of between about 30 and about 1000 Å" and "generally thicker than 100 Å". In addition, there is evidence here of unexpected results with the claimed narrower range. For example, on page 5, lines 1-6, of the specification, the Applicant states that:

[t]he perpendicular magnetic enhancement layer 26 is formed of a metal with excellent perpendicular orientation properties, and preferably, Pt, Au, Pd or an alloy of these materials to a thickness of 15 nm or greater. It has been experimentally found by the inventors that the perpendicular magnetic enhancement layer having a thickness of 15 nm or greater ensures stable depositions of the underlying and overlying layers. (emphasis added).

The Applicant further describes on page 10, lines 7-11 of the specification, in conjunction with FIG. 7, that:

[t]he x-ray diffraction spectra for the PMR disks manufactured in Examples 1 and 2 and Comparative Example 4, in which the Pr perpendicular magnetic enhancement layers have different thicknesses, are shown in FIG. 7. A weak Pt(111) diffraction peak is observed for the PMR disk of Comparative Example 4 having a 10-nm-thick Pt perpendicular magnetic enhancement layer. (emphasis added).

The cited portions above and the experimental results provided evidence the unexpected results obtained when using a perpendicular magnetic enhancement layer having a face centered cubic structure and a thickness of 15 nm or greater in the PMR medium defined by claim 1. In contrast, Tang does not disclose how their

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nucleating layer 32 interacts with the other layers in their PMR structure, much less any critical depth of the layer 32. As discussed above, Tang disclose the use of several different ranges for this layer that span from 3 nm. Thus, the Applicant respectfully asserts that Tang does not disclose the narrower claimed range of "a thickness of 15 nm or greater" with sufficient specificity to constitute an anticipation of the claims. Accordingly, claim 1 is believed not to be anticipated by Tang as well.

Since none of Do, Nakamura, or Tang individually disclose all of the features of amended claim 1, the claim is considered allowable over each of the cited documents. Moreover, the remaining claims that depend from claim 1 are considered allowable for at least these same reasons.

In addition to the above, claim 4 is considered allowable because none of the cited documents disclose "the perpendicular orientation promoting underlayer is formed of Ti or a Ti alloy and has a thickness less than 10 nm". For example, Do's underlayer is formed of Ni₅₀Al₅₀. Nakamura disclose an underlayer formed of Ti, but disclose that the thickness is 20 nm. Finally, Tang disclose a permalloy (NiFe) soft magnetic underlayer 31 having a depth greater than about 100 nm. See col. 9, l. 25. Accordingly, claim 4 is considered allowable for this reason as well.

It is believed this application is in condition for allowance and an early Notice thereof is earnestly solicited. If any questions remain, the Examiner is invited to phone the undersigned at the below-listed number.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: _____

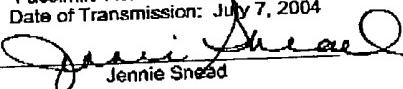

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